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Cross-Standardization of the Army Qualification Battery, AQB-1

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(6) CROSS STANDARDIZATION OF THE ARMY QUALIFICATION BATTERY, AQB-1,

(10) Carrie J. Waters, Alan A. Anderson, and Leonard C. Seeley

A. G. Bayroff, Task Leader

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Submitted by

Edmund F. Fuchs
Chief, Military Selection Research Laboratory

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CROSS STANDARDIZATION OF THE ARMY QUALIFICATION BATTERY, AQB-1

BACKGROUND AND PURPOSE

The Armed Forces Qualification Test (AFQT) is the screening test used to determine mental qualification for acceptance in the Armed Forces. Differential measures of an individual's aptitudes are derived from composites of his scores on the Army Classification Battery (ACB). The composites, or aptitude area scores, each reflect a combination of aptitudes required in a particular Army occupational area.

In October 1957, the ACB was introduced at six Armed Forces Examining Stations (AFES) as a supplementary screening measure for Category IV (AFQT percentile scores 10 - 30) applicants for enlistment with the requirement that an individual must pass at least two aptitude areas with a standard score of 90. This program was extended to all AFES in August 1958 and was applied to Selective Service registrants as well as non-prior service enlistees. Since January 1959 an AFQT percentile score of 31 or higher has been required for non-prior service enlistment in the Regular Army. The ACB continued to be used with Category IV Selective Service registrants processed through AFES until 1961, when it was replaced by the Army Qualification Battery, AQB-1.

The ACB, developed to cover a wide range of ability levels, contains many items beyond the capacity of Category IV personnel. The Army Qualification Battery (AQB-1), less time consuming than the ACB and more appropriate for Category IV personnel (Bayroff, Seeley, and Anderson, 1959, 1960), consists of the four AFQT subtests (Verbal, Arithmetic Reasoning, Tool Functions, and Spatial Relations) which had previously been found to be good measures of counterpart ACB tests, and four other short tests (Mechanical Aptitude, Electrical Information, Automotive Information, and Clerical Speed) which were constructed to parallel additional ACB tests.[1]

The objectives of the present study were (1) to reexamine the effectiveness of the AQB-1 as compared to that of the ACB for screening Category IV personnel at AFES, and (2) to compare the norms obtained in this study with those obtained in the previous analysis.

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[1] In July, 1962, the tests of AQB-1 were replaced by AQB forms 2 and 3. The battery contained two additional tests, the General Information Test and the Classification Inventory, counterparts of two ACB measures developed to contribute to the prediction of combat aptitude.

PROCEDURE

SAMPLES

Two independent samples were analyzed in this study. Sample I consisted of 1,032 Category IV Selective Service registrants from ten AFES (New York, Cincinnati, Louisville, Atlanta, Montgomery, Houston, San Antonio, Chicago, Los Angeles, and Oakland). Data were collected in 1958 (Seeley and Anderson, 1962). This sample was not completely stratified, although preliminary analysis of these data showed that 56 percent of the cases were in the 10-20 percentile range on AFQT.

Sample II consisted of 1,050 Category IV Selective Service registrants from six AFES (New York, Atlanta, New Orleans, Detroit, Oakland, and Los Angeles) selected, in November 1959, on the basis of operational AFQT scores as follows:

AFQT percentile	Number of cases
25-30	300
20-24	250
15-19	250
10-14	250

In both samples, the AQB tests were administered first and the ACB followed. In the earlier standardization study (Bayroff, Seeley, and Anderson, 1959), based on training division rather than AFES samples, the reverse order was used with AQB-1 following ACB.

VARIABLES

The following variables were analyzed in the present study:

Counterpart tests of AQB-1 and ACB. The first four AQB-1 tests listed are from AFQT 5-6.

Verbal
Arithmetic Reasoning
Shop Mechanics (Tool Functions)
Pattern Analysis (Spatial Relations)
Army Clerical Speed
Automotive Information
Mechanical Aptitude
Electronics Information

Aptitude areas derived from AQB-1 and ACB.

Combat A
Combat B
Electronic
General Maintenance
Motor Maintenance
Clerical
General Technical

STATISTICAL ANALYSIS

In order to evaluate the efficiency of AQB-1 as an alternative to the ACB for screening Category IV personnel, a contingency table was computed for each sample, giving the proportion of that sample scoring above a standard score of 90*:

1. on two or more aptitude areas of both AQB-1 and ACB; that is, qualifying on both batteries

2. on fewer than two aptitude areas of both AQB-1 and ACB; that is, qualifying on neither battery

3. on two or more aptitude areas of AQB-1, but fewer than two on ACB; that is, qualifying on AQB-1 but failing on ACB

4. on fewer than two aptitude areas of AQB-1, but two or more on ACB; that is, failing on AQB-1 but qualifying on ACB

The cut point of two or more aptitude areas above a standard score of 90 was chosen to reflect the current operational procedure of accepting a Category IV man only if he scores above a standard score of 90 on at least two aptitude areas.

Similar tables were computed for each AQB-1 aptitude area and its ACB counterpart aptitude area, using above or below a standard score of 90 as the point of cut.

Raw to standard score conversions were made for each AQB-1 test using the equipercentile method. The ACB counterpart tests were used as the reference scales. Separate conversions were made for each sample. These norms were compared to norms computed previously for a full range sample during the initial standardization of AQB-1 (Bayroff, Seeley, and Anderson, 1959).

RESULTS

Substantially larger percentages of the samples passed a given number of ACB aptitude areas than passed corresponding numbers of AQB-1 aptitude areas (Table 1). Since AQB-1 was administered first, these differences

* "above a standard score of 90", as used in this report, includes the score of 90.

Table 1

PERCENTAGES OF CATEGORY IV SELECTIVE SERVICE REGISTRANTS PASSING (AT 90 OR ABOVE) ON AQB VS ACB APTITUDE AREAS

Number of Aptitude Areas Passed	% Passing			
	Sample I (N = 1032)		Sample II (N = 1050)	
	AQB-1[a]	ACB	AQB-1[a]	ACB
3 or more	35.1	54.0	43.0	56.5
2 or more	57.3	70.5	64.2	74.3
1 or more	79.0	86.5	86.2	88.0
none	21.0	13.5	13.8	12.0

[a]AQB-1 administered first.

may reflect enhancement of ACB scores as a result of practice on similar AQB-1 tests. In the standardization study (Bayroff, Seeley, and Anderson, 1959), in which ACB was administered first and AQB-1 second,[2] these results were reversed and AQB-1 produced more passers. These results lend further credence to the hypothesis concerning practice.

Table 2 shows the proportions of the two samples accepted by both AQB-1 and ACB, rejected by both AQB-1 and ACB, accepted by AQB-1 but rejected by ACB, and rejected by AQB-1 but accepted by ACB. In both samples the proportion scoring above 90 on two or more ACB aptitude areas (.71, .74) was greater than the proportion scoring above 90 on two or more AQB-1 aptitude areas (.57, .64). Again because of the order in which the two batteries were administered, practice on AQB-1 tests probably enhanced performance on similar ACB tests. About three-fourths of the men in each sample were classified as accepted by both AQB-1 and ACB or rejected by both.

Table 3 presents a summary of the contingency tables for the individual AQB-1 aptitude areas and their ACB counterparts. In general, 60 to 80 percent of each sample either scored 90 or above on both AQB-1 and ACB aptitude area counterparts or below 90 on both.

[2]The AFQT part of AQB-1 was readministered at training divisions.

Table 2

CATEGORY IV ACCEPTANCE AND REJECTION RATES ON AQB-1 AND ACB

Sample I (N = 1032)

	ACB--above 90 on zero or one aptitude area	ACB--above 90 on two or more aptitude areas	
AQB-1--above 90 on two or more aptitude areas	.06	.51	.57
AQB-1--above 90 on zero or one aptitude area	.23	.20	.43
	.29	.71	

Proportion classified the same by AQB-1 and ACB .74

Sample II (N = 1050)

	ACB--above 90 on zero or one aptitude area	ACB--above 90 on two or more aptitude areas	
AQB-1--above 90 on two or more aptitude areas	.09	.55	.64
AQB-1--above 90 on zero or one aptitude area	.17	.19	.36
	.26	.74	

Proportion classified the same by AQB-1 and ACB .72

Table 3

PROPORTIONS IN SAMPLE I (N = 1032) AND SAMPLE II (N = 1050) SCORING 90 OR ABOVE OR BELOW 90 ON AQB-1 AND ACB APTITUDE AREAS

Aptitude Area	Sample	90 or above on both AQB-1 and ACB	Below 90 on both AQB-1 and ACB	Classified Same on both AQB-1 and ACB	Below 90 on AQB-1, 90 or above on ACB	90 or above on AQB-1, below 90 on ACB	Classified differently on AQB-1 and ACB
Combat A	I	.10	.54	.64	.29	.07	.36
	II	.13	.51	.64	.25	.11	.36
Combat B	I	.17	.46	.63	.30	.07	.37
	II	.19	.44	.63	.28	.09	.37
Electronics	I	.23	.45	.68	.19	.13	.32
	II	.22	.39	.61	.21	.18	.39
General Maintenance	I	.21	.40	.61	.22	.17	.39
	II	.26	.31	.57	.20	.23	.43
Motor Maintenance	I	.33	.48	.81	.12	.07	.19
	II	.29	.47	.76	.16	.08	.24
Clerical	I	.27	.42	.69	.30	.01	.31
	II	.27	.34	.61	.37	.02	.39
General Technical	I	.16	.68	.84	.11	.05	.16
	II	.17	.67	.84	.10	.06	.16

NORMATIVE DATA

The norms determined for each AQB-1 test in the two samples corresponded closely. Norms for five of these tests (Verbal, Arithmetic Reasoning, Shop Mechanics, Automotive Information and Electrical Information) were in close agreement with those obtained from a full-range of talent sample in the original standardization study (Bayroff, Seeley, and Anderson, 1939). Norms for two of the tests (Mechanical Aptitude and Pattern Analysis) differed by one-half a standard deviation from the original ones while the Army Clerical Speed norms varied by about one standard deviation from the original norms (same raw score converted to a higher standard score). Since the ACS is a speeded test, it could be expected to be influenced by practice, but of the other tests why only the Mechanical Aptitude and Pattern Analysis showed a marked discrepancy from the original norms is not clear.

CONCLUSIONS

Substantial agreement was found between AQB-1 and ACB in accepting and rejecting Category IV personnel. The norms determined for five of the AQB-1 tests in both Category IV samples were in close correspondence to those obtained in an earlier full-range sample. Practice effects from a different order of administration of the tests probably account for substantial differences between norms obtained in this study and the original norms for three of the AQB-1 tests.

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